Nikon

AUTO-OPTESTER OT-8A

Repair Manual

NIKON CORPORATION

TOKYO, JAPAN

Table of Contents

I. OT-8A TEST PROGRAM I-1

1. Key Names I-2
2. Entering the Test Program I-3
3. How to Use Each Key I-3
4. Exiting from the Test Program I-9

II. MECHANICAL ADJUSTMENT PROCEDURE .....

III. OT-8A ERROR MESSAGE III-1

OT-8A Error Message III-2

IV. REPLACEMENT OF BOARD FOR OT-8A IV-1

1. Operation Unit IV-2
2. Lens Chamber IV-4
3. Printer IV-5

V. EXTERNAL OUTPUT AND INITIAL SETTING V-1

1. Factory Initial Setting V-2
2. Entering the Initial Setting Mode V-2
3. Setting for Customer 1 ..... V-3
4. Setting for Customer 2 ..... V-8
5. Setting of the Interface (RS-232C) V-12
6. Exiting from the Initial Settings Mode V-15
7. Printing Out the Initial Settings V-15
8. Setting for Using the Optional Remote Controller V-17

I. OT-8A TEST PROGRAM

1. Key Names I-2

2. Entering the Test Program I-3

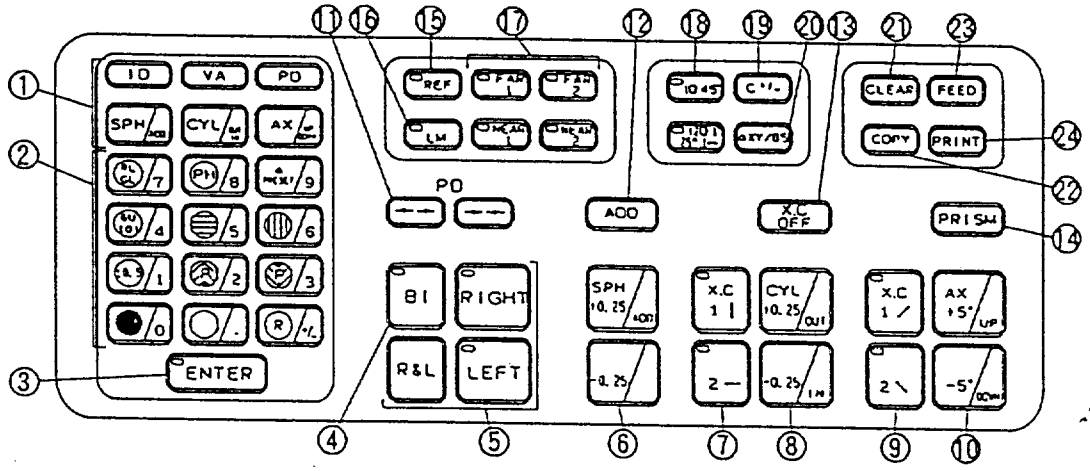
3. How to Use Each Key I-3

   3-1. Mode Selection I-3
   3-2. Selecting the Lens Plate I-4
   3-3. Driving the Lens Plate I-5
   3-4. Automatic Continuous Rotation Mode I-6
   3-5. Writing Offset Values I-6
   3-6. Setting Initial Settings for the Factory State I-9

4. Exiting from the Test Program I-9

1. Key Names

The names of the keys on the OT-8A operation panel are listed below. This manual uses the abbreviation of each key name.



(1) Data selector key: [ID] [VA] [PD] [SPH] [CYL] [AX]
(2) Auxiliary lens/ten keys: [1] [2] [3] [4] [5] [6] [7] [8] [9] [0] [.] [+/-]
(3) ENTER key: [ENTE]
(4) Binocular key: [BI]
(5) R/L key: [R] [L] [R/L]
(6) S+/- key: [S+] [S-]
(7) Cross cylinder keys for cylindrical power: [XCC1] [XCC2]
(8) C+/- key: [C+] [C-]
(9) Cross cylinder keys for cylindrical axis: [XCA1] [XCA2]
(10) AX+/- key: [AX+] [AX-]
(11) PD key: [→←] [←→]
(12) ADDITION key: [ADD]
(13) Cross cylinder off key: [XCOF]
(14) PRISM key: [PRIS]
(15) Auto ref data input key: [REF]
(16) Auto lensmeter data input key: [LM]
(17) FAR/NEAR key: [FAR1] [FAR2] [NEA1] [NEA2]
(18) Fine step key: [0. 12] [1.00]
(19) Cylindrical power transposition key: [C+/-]
(20) XY/BS key: [XYBS]
(21) CLEAR key: [CLEA]
(22) Copy key: [COPY]
(23) PAPER FEED key: [FEED]
(24) PRINT key: [PRIN]

2. Entering the Test Program

Holding down [ADD] and [PRIS] keys together, turn on the POWER switch. When initialization of the lens chamber is completed, ".001" is displayed at the top of the left eye field in the lens chamber display.

Note that if you enter the program with the motor and sensor connectors off, it may take a long time for OT-8A to enter test mode because information concerning those connectors cannot be provided.

3. How to Use Each Key

3-1. Mode Selection

[FAR1]: Frame mode

Pressing [S+] or [S-] key once rotates the lens plates by one frame (30°), the astigmatism and prism lenses by 360°, and the PD by 10 mm.

[FAR2]: Pulse mode

- Pressing [S+] or [S-] key once rotates the lens plates and lenses by one pulse of the motor.
- Pressing [XCC1] or [XCC2] key once rotates the lens plates and lenses by ten pulses of the motor.

[NEA1]: Initialize mode

Pressing [NEA1] key and one of [1] through [9] keys initializes the lens plate, lens or PD drive mechanism specified from the ten-key pad.
Pressing [0] key initializes all the drive mechanisms.

3-2. Selecting the Lens Plate

Ten keys [1] through [8] correspond to the lens plates in order from the patient side.

[1]: Pola and medium-power lens plate

[2]: High-power spherical lens

[3]: Recos plate

[4]: Low-power spherical lens

[5]: Minus astigmatism lens

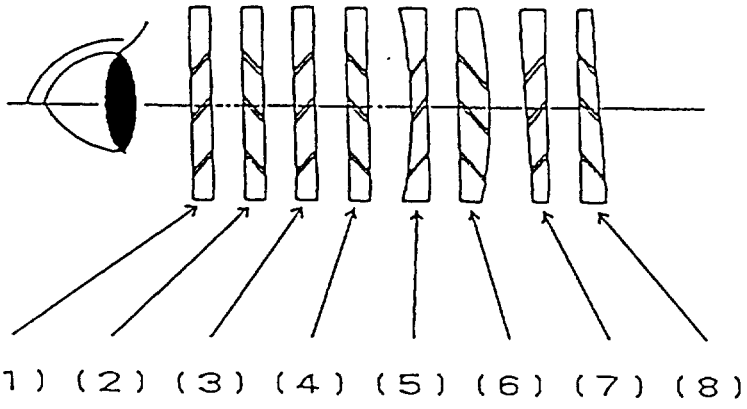
[6]: Plus astigmatism lens

[7]: Prism lens

[8]: Prism lens

[9]: PD drive mechanism: This operates whichever the right or the left, is selected.

Press [R] to select the lens section for the right eye. Press [L] to select the lens section for the left eye. Press [R/L] to select both the lens sections.



3-3. Driving the Lens Plate

This subsection refers to the rotation directions of lenses on the tester side.

[S+]: Lens plates and lenses [1] through [8] .... These rotate counterclockwise.
PD [9] ..... This narrows.

[S-]: Lens plates and lenses [1] through [8] .... These rotate clockwise.
PD [9] ..... This widens.

In frame mode [FAR1], lens plates [1] through [4] rotate by one frame (30°), the astigmatism and prism lenses rotate by 360°, and the PD [9] moves by 10mm.

In pulse mode [FAR2], drive mechanisms [1] through [9] operate by one pulse of the motor.

[XCC1]: In pulse mode [FAR2], pressing this key rotates lens plates and lenses [1] through [8] counterclockwise by ten pulses of the motor.

[XCC2]: In pulse mode [FAR2], pressing this key rotates lens plates and lenses [1] through [8] clockwise by ten pulses of the motor.

[C+]: This key adjusts lenses [5] and [6] to change the cylindrical power by +0.25Dpt.
[C-]: This key adjusts lenses [5] and [6] to change the cylindrical power by -0.25Dpt.

The fine step key [0.12] can be used to change the adjustment step to 0.125Dpt.

[XCA1]: This key adjusts lenses [5] and [6] to change the cylindrical power by +3.00Dpt.
[XCA2]: This key adjusts lenses [5] and [6] to change the cylindrical power by -3.00Dpt.

The fine step key [0.12] can be used to change the adjustment step to 1.00Dpt.

[AX+]: This key rotates the minus astigmatism lens [5] by 180°.
[AX-]: This key rotates the plus astigmatism lens [5] by 180°.

[←→]: This key rotates both astigmatism lenses [5] and [6] counterclockwise.
[→←]: This key rotates both astigmatism lenses [5] and [6] clockwise.
[C+/-]: This key rotates both prism lenses [7] and [8] counterclockwise.
[XYBS]: This key rotates both prism lenses [7] and [8] clockwise.
[BI]: Pressing this key to turn on the LED enters the motor into quick rotation mode.
Pressing this key to turn off the LED enters the motor into normal rotation mode.
[1:00]: Pressing this key to turn on the LED enters the motor into medium-speed rotation (test) mode.
Pressing this key to turn off the LED enters the motor into normal rotation mode.

[COPY]: Moves lenses [1] through [4] to the hole for wiping the lenses. Pressing this key again returns the lenses to the normal position.

[0.12]: Pressing this key to turn off the LED puts the lenses into position at the diecast hole for wiping the lenses, with the display cover (tester side) removed.
Pressing this key to turn off the LED puts the lenses into position at the hole for wiping the lenses, which can be seen be removing the NIKON nameplate on the display cover (patient side). (Do not remove the NIKON nameplate if a replacement is not available.)

3-4. Automatic Continuous Rotation Mode

[REF]: Pressing this key causes the lenses to rotate and stop intermittently for about 50 minutes and then stop in the original mode. Turn off the power to exit from this mode.

[1] key ..... Rotates lens plates [1] through [4] intermittently about 11 seconds, each.
[2] key ..... Rotates astigmatism lenses [5] and [6] intermittently about 11.5 seconds, each.
[3] key ..... Rotates prism lenses [7] and [8] intermittently about 12 seconds, each.
[4] key ..... Rotates lenses [5] through [8] intermittently about 12 seconds, each.
[5] key ..... Drives the PD motor [9] intermittently.
[6] key ..... Rotates lens plates and lenses [1] and [8] intermittently about 13.5 seconds, each.
[7] key ..... Activates all the drive mechanisms [1] and [9] intermittently about 16 seconds, each.

3-5. Writing Offset Values

Since the sensors of the lens plates and lenses are not fixed, they may not be positioned correctly. Therefore, the amount of dislocation, a offset value, must be written to the test program to make that program correct the position of the lens plates and lenses. Offset values are written to the memory EEPROM.
To write offset values, perform fine adjustment of the position of the lens plates and lenses in pulse mode [FAR2], then complete the following steps. You may not write compensation values without doing fine adjustment.
Since the displayed offset values are stored in memory, they cannot be verified during fine adjustment.
When you write or delete offset values to or from memory (EEPROM), set DIP switches Nos. 1 and 2, located on the CPU board in the lens chamber, to ON.
When you complete the writing or deletion, reset DIP switches Nos. 1 and 2 to OFF.

(1) To delete all data from memory (EEPROM), press the following keys in sequence: [LM], [CLEA], [CLEA] and [ENTE]. This sets each offset value to "0".

(2) Writing offset values

* Lens plate
To write the offset values for the plates [1] through [4] to memory, press the following keys in sequence: [LM], [SPH] and [ENTE].

* Astigmatism lens
To write the offset values for the astigmatism lenses [5] and [6] to memory, press the following keys in sequence: [LM], [CYL] and [ENTE].

* Prism lens
To write the offset values for prism lenses [7] and [8] to memory, press the following keys in sequence: [LM], [AX] and [ENTE].

* Pupil distance
To write the offset values for the right-eye pupil distance and left-eye pupil distance to memory separately, press the following keys in sequence: [LM], [PD] and [ENTE].

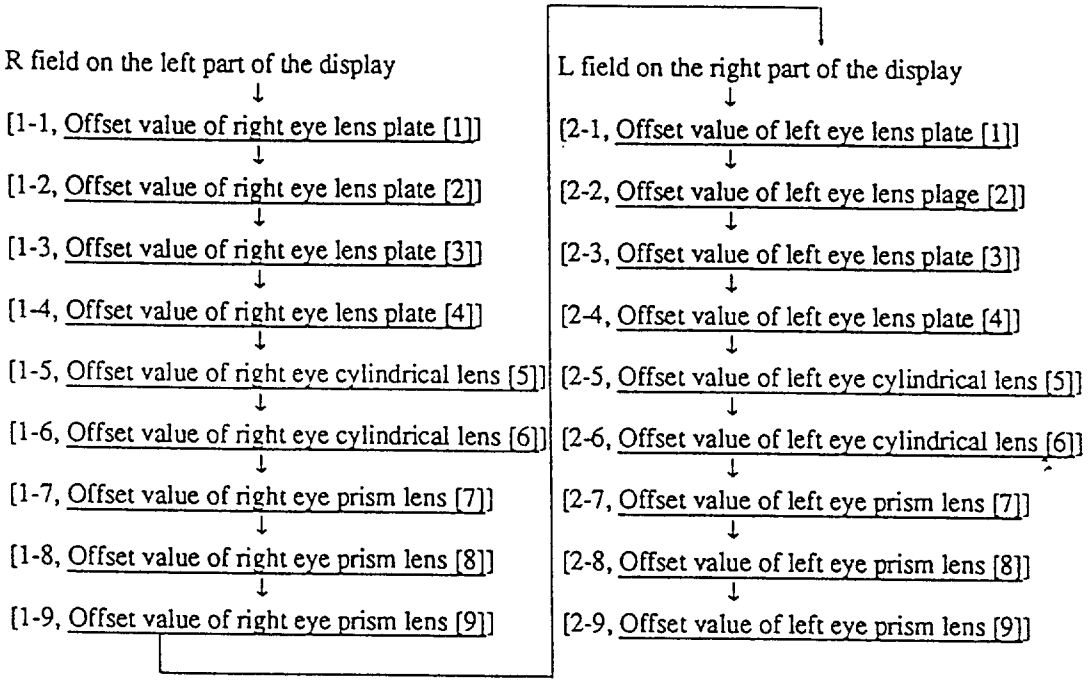
* Identification number
To write an identification number to memory, press the following keys in sequence: [LM], [ID], XXXXX, and [ENTE].

Enter a 5-digit number from the ten-key pad.

Before the above work, select the right or left eye lens section by using the [R] or [L] key. Offset values cannot be written in binocular mode [R/L].

(3) Displaying offset values
Pressing [LM], [PRIN] and [ENTE] in sequence outputs offset values from memory (EEPROM) to the lens chamber display.

The order of the display is as follows:


R field on the left part of the display
[1-1, Offset value of right eye lens plate [1]]
[1-2, Offset value of right eye lens plate [2]]
[1-3, Offset value of right eye lens plate [3]]
[1-4, Offset value of right eye lens plate [4]]
[1-5, Offset value of right eye cylindrical lens [5]]
[1-6, Offset value of right eye cylindrical lens [6]]
[1-7, Offset value of right eye prism lens [7]]
[1-8, Offset value of right eye prism lens [8]]
[1-9, Offset value of right eye prism lens [9]]
L field on the right part of the display
[2-1, Offset value of left eye lens plate [1]]
[2-2, Offset value of left eye lens plage [2]]
[2-3, Offset value of left eye lens plate [3]]
[2-4, Offset value of left eye lens plate [4]]
[2-5, Offset value of left eye cylindrical lens [5]]
[2-6, Offset value of left eye cylindrical lens [6]]
[2-7, Offset value of left eye prism lens [7]]
[2-8, Offset value of left eye prism lens [8]]
[2-9, Offset value of left eye prism lens [9]]

After the above values are displayed, finally the following information is listed.

Left part of display	Right part of display
[Product number: First digit]	[dISP]
[Product number: Last four digits]	[ENd]
[Sum check value]	[Ver.No.]

* Offset values are used to correct the positions of lens plates [1] through [4], the angles between the base and axis for lenses [5] through [8], and the difference from 64 mm for the PD.

3-6. Setting the Initial Settings for the Factory State

(1) Setting the factory state

① Open the DIP switch cover on the bottom of the operation unit. Set No. 7 on DIP switch S1 and No. 1 on DIP switch S2 to ON.

② Holding down the [ADD] and [PRIS] keys together, turn on the power to enter the test program.

③ Press the [NEA1] and [FAR1] keys to turn on the LED.

④ Press the secret key between the [ADD] key and the [XCOF] key, then press the [ENTE] key. The factory state initial settings are set to export specifications.

⑤ Turn off the power, set No. 7 on DIP switch S1 and No. 1 on DIP switch S2 to OFF, then close the cover.

(2) Printing out the initial settings
Press the [PRIN] key to print out the initial settings in the operation unit CPU board memory.

** Sample printout

<Initial settings> [Export model]

```
1.1 print form  1    1.2 sign of SPH -
1.3 sign of CYL -    1.4 auto SPH +  on
1.6 data select YMD  1.7 time select 24h
2.1 recos reti  1.5  2.2 prism set   on
2.3 va select   0.1  2.4 X.C value   .5
2.5 chart auto  on   2.6 PD select   R.L
3.1 RS232C CH1  nnk  3.2 RS232C CH2  off
3.3 entry 1data on   3.4 out RS232C  off
```

4. Exiting from the Test Program

The only method of exiting from the test program is to turn OFF the power switch.

III. OT-8A ERROR MESSAGE

OT-8A Error Message III-2

OT-8A Error Message

This chapter describes the messages of communication errors which may occur in version 1.0 or later of ROM used in the OT- 8A lens chambers.

Error message	Description	Cause
E101	• Communication error between a lens chamber and the operation unit. • DTR control (communication request) error when communication is started.	• CPU does not operate properly when OT-8A is turned on. • The communication cable is broken • U7 M89251A in the operation unit or a lens chamber is faulty.
E102	• Since offset data in EEPROM of a lens chamber is incorrect, initialization cannot be done.	• U5 EEPROM is faulty. • OT-8A was turned on with the DIP switch S1 ON, which disables writing of data. • Noise such as static electricity.
E103	• Data cannot be written to EEPROM of a lens chamber.	• The DIP switch S1 which disables writing of data was set incorrectly. • U5 EEPROM is faulty.
E104 E105 E106 E107	• These errors occur during debugging of ROM under development (These do not appear in products units).	• These errors occur when a bug is found.
E202 E203 E204 E205 E206 E207 E208 E209	• Errors occurring during an exchange of data between a lens chamber and the operation unit. (OT-8A may automatically recover from these errors.)	• A noise. • U7 M89251A in the operation unit or a lens chamber is faulty. • The communication cable is broken. • The CPU & MEMORY board in the operation unit or a lens chamber are faulty.

IV. REPLACEMENT OF BOARD FOR OT-8A

1. Operation Unit IV-2

2. Lens Chamber IV-4

3. Printer IV-5

1. Operation Unit

① CPU & MEMORY board (1)

a. Notes
- Make sure that the EPROMs (U14, U15, U16) are the latest versions.
- Remove the U6 EEPROM from the old CPU board and insert it on the new board. Reset the initial settings if a new EEPROM is used.
- Set No. 2 on DIP switch S2 to ON.
- Set the DIP switch S1 according to the setting of that on the old board.
- Connect the connectors with the external interface and lens chamber correctly.

Connectors on a board	Connector name
J2: 9 pins J3: 9 pins	A cable from the external interface CH1 A cable from the external interface CH2
J1: 7 pins, for signal J9: 8 pins, for power	A cable from the upper part of the connector to a lens chamber A cable from the lower part of the connector to a lens chamber
J7: 8 pins	A cable from the IC card reader/writer

b. Check after replacement (if possible)
- With a lens chamber connected, check the supply voltage using a tester.

Power supply	Pin to be checked	Voltage
$+5V_D$	TP1 (RED) - TP4 (BLACK)	+5.1V±0.2V
$+5V_D$	TP9 (RED) - TP10 (BLACK)	+5.1V±0.2V
$+12V_D$	TP2 (RED) - TP4 (BLACK)	+11.9V±0.2V
$+12V_D$	TP5 (RED) - TP10 (BLACK)	+11.9V±0.2V
$-12V_D$	TP3 (RED) - TP4 (BLACK)	−12.0V±0.2V
$-12V_D$	TP6 (RED) - TP10 (BLACK)	−12.0V±0.2V
$+12V_M$	TP8 (RED) - TP10 (BLACK)	+18.0V±1.5V (when motor is stopped) +13.0V ~ +18.0V (when motor is in operation)

* TP10 is a grounding pin (GND). The (red) and (black) are the colors of tester cables.

- Check that all keys operate properly. When each key is pressed, a buzzer must sound.

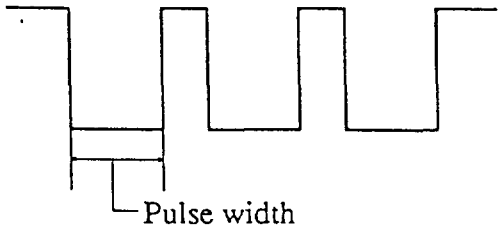
c. Check after assembly
- Turn on OT-8A and make sure that an error message or "AAAA" does not appear on the lens chamber display.
- Turn on OT-8A and make sure that all LEDs on the operation unit and lens chamber are lit.
- Make sure that the volume VR2 can control the contrast of LCD, and adjust the contrast.
- Make sure that initialization of lens chamber is completed.
- Make sure that the volume VR1 can control the level of key buzzer, and adjust the sound level.
- Set the date and time.
- Make the required initial setting, paying particular attention to the setting concerning communication.

② Printer & key display control board

a. Note
- A spacer is inserted between this board and the keyboard.

b. Adjustment after replacement
- Use VR1 to adjust the density of printed image.
  Connect an oscilloscope with TP2 and TP4 (GRD) and adjust the pulse width according to the rank indicated on the printer head cable.

Rank of printer head	A	B	C
Pulse width	101 ± 2µsec	92 ± 2µsec	83 ± 2µsec



- Use the DIP switch S1 to eliminate horizontal deviation of printer head. Press [PRINT] key to print characters. Correct horizontal deviation between the first and second lines by changing the setting of the DIP switch S1.

No. 1	No. 2	Deviation
ON	ON	0
OFF	ON	−1
ON	OFF	+1
OFF	OFF	+2

When setting of the DIP switch is changed, turn OT-8A off and on again.

③ Keyboard board

a. Note
- When installing the keyboard board, position the set of switches on the board under the keyboard.

④ Other boards (printer interface board and printed circuit board)
- Note connector locations.

2. Lens Chamber

① CPU & MEMORY board (2)

a. Notes
- Check that the EPROM (U3 and U4) is of the latest version (Ver 1.5 was the latest on June 13, 1989).
- Transfer the EEPROM (U5) from the old board and to the new board.
- Fit the insulating plastic plate and spacer to the board.
- Make sure that the DIP switch S1 is all OFF.
- Connect correctly the connectors of the motor and sensor cables with the board.
- Carefully fit the front cover.

b. Check after assembly
- Turn on OT-8A and make sure that an error message or "AAAA" does not appear on the lens chamber display.
- Turn on OT-8A and make sure that all LEDs on the lens chamber are lit.
- Make sure that initialization of lens chamber is completed.
- In test mode, press [LM], [PRINT] and [ENTER] keys in that order. Check that the displayed offset values are the same as those marked on the upper cover of the lens chamber body.

② Display board

a. Notes
- Position the area including the circuits of LEDs and 7-segment displays in the display board under the display on the front cover.
- Connect the connectors J1 and J2 in the correct orientation.
- Orient the circuits of the LEDs for D50 and D51 signals on the board straight to the front.
- Carefully fit the front cover.

b. Check after assembly
- Turn on OT-8A and make sure that all LEDs on the lens chamber are lit.
- Check that all the LEDs and 7-segment displays have the same brightness.

3. Printer

a. Notes
- Take care not to cut the printer head cable.
- Install the printer in a place that will not cause paper jam.

b. Adjustment after replacement
- Use VR1 on the CPU & MEMORY board (1) to adjust the density of printed image.
  Connect an oscilloscope with TP2 and TP4 (GRD) and adjust the pulse width according to the rank indicated on the printer head cable.

Rank of printer head	A	B	C
Pulse width	101 ± 2µsec	92 ± 2µsec	83 ± 2µsec

V. EXTERNAL OUTPUT AND INITIAL SETTING

1. Factory Initial Setting V-2
2. Entering the Initial Setting Mode V-2
3. Setting for Customer 1 ..... V-3
4. Setting for Customer 2 ..... V-8
5. Setting of the Interface (RS-232C) V-12
6. Exiting from the Initial Settings Mode V-15
7. Printing Out the Initial Settings V-15
8. Setting for Using the Optional Remote Controller V-17

OT-8A
External Output and Initial Setting

This chapter describes the initial setting in ROM of the version or later.

1. Factory Initial Setting

a. for CUSTOMER 1
- PRINT FORMAT ——— 1. subj (F1, F2, N)
- SIGN OF SPH ——— 1. minus sign
- SIGN OF CYL ——— 1. minus sign
- AUTO SPH+ (XC) ——— 1. auto
- DATE TIME SET ——— 9111271030 (set at factory)
- DATE Y.M.D SELECT — 1. Y.M.D
- TIME 24h or 12h ——— 1. 24h

b. for CUSTOMER 2
- RECOS RETINO ——— 1. 1.50D
- PRISM PRESET ——— 1. ON (Export)
- VA SELEC ——— 2. 0.1 (decimal display)
- VALUE OF X.C ——— 1. 0.50D
- CHART AUTO MOVE — 2. OFF
- PD SELECT ——— 1. R PD, L PD (Export)

c. for INTERFACE
- RS232C CH1 ——— 2. NR-5100
- RS232C CH2 ——— 4. no use
- 1 DATA DIRECT IN —— 1. YES (receive only one data)
- DATA OUT AT PRIM — 3. no data out

OT-8A is shipped with the above initial settings.

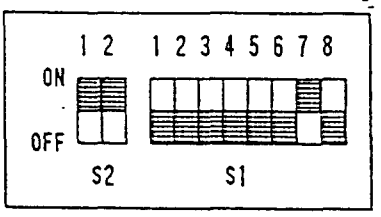
These initial settings are stored in the U6 EEPROM on the operation unit CPU board. If you replace the board, be sure to use the U6 EEPROM from the old board.

2. Entering the Initial Settings Mode

① Turn off the OT-8A operation unit power switch.

② Turn the operation unit over. Remove the + screw on the DIP switch cover on the bottom of the operation unit and turn the cover 90° to expose the DIP switch.

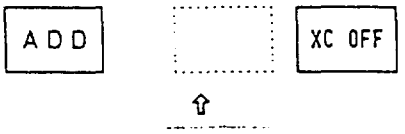
③ Set No. 7 (Initial setting selection) on DIP switch S1 and No. 1 (EEPROM write protection) on DIP switch S2 to ON.



DIP switch on bottom of operation unit.

④ Turn on the power. The OT-8A enters the normal mode.

⑤ Press the secret key between the [ADD] key and the [X. C OFF] key.



Secret key

⑥ Enter the initial settings mode.
The following menu appears:

```
NO.  --- initial select ---
 1. for customer 1
 2. for customer 2
 3. interface
                9. exit
                0. set

                    select ?
```

* Press [9] key to exit from the initial settings mode and return to the measurement display screen.

3. Settings for Customer 1

→ Press [1] and [0] keys in sequence.
The following menu appears:

```
NO.  --- for customer 1 ---
 1. print form    6. date Y.M.D
 2. sign of SPH   7. time 24h
 3. sign of CYL
 4. auto sph +    9. exit
 5. date time     0. set

                    select ?
```

① Specify the print format in which data is printed on the printer built in the OT-8A operation unit. → Press [1] and [0] keys in sequence.
The following menu appears:

```
NO.  --- print format ---
 1. subj (F1, F2, N1, N2)
 2. subj + obj (REF, LM)
 3. subj + eye
 4. s + o + eye  9. exit
 5. no print     0. set

                    select ?
```

- To print only subjective data measured on OT-8A. → Press [1] and [0] keys in sequence.
- To print subjective data measured by OT-8A, objective data measured by the auto refractometer [REF], and data measured by the auto lensmeter [LM]. → Press [2] and [0] keys in sequence.
- To print subjective data measured on OT-8A and eye ball prints. → Press [3] and [0] keys in sequence.
- To print subjective data measured by OT-8A, objective data measured by the auto refractometer [REF], data measured by the auto lensmeter [LM], and eye ball prints. → Press [4] and [0] keys in sequence.
- If you do not use the printer built in the OT-8A operation unit. → Press [5] and [0] keys in sequence.
- To return to the data listing screen. → Press [9] key.

② Specify which format is given priority, positive or negative, when entering a spherical power (SPH) from the ten-key pad on the OT-8A control panel.
→ Press [2] and [0] keys in sequence.
The following menu appears:

```
NO.  --- sign of SPH ---
 1.  minus sign
 2.  plus sign

              9. exit
              0. set

                  select ?
```

- To give negative format priority. → Press [1] and [0] keys in sequence.

• To give positive format priority. → Press [2] and [0] keys in sequence.

* When you have selected the negative format (minus sign option) in this menu, if you want to use the positive format, press the [+/-] key on the ten-key pad.
When you have selected the positive format (plus sign option) in this menu, if you want to use the negative format, also press the [+/-] key.

Pressing the [+/-] key alternates the plus and minus signs.

• To return to the data listing screen. → Press [9] key.

③ Specify which format is given priority, positive or negative, when entering a cylindrical power (CYL) from the ten- key pad on the OT-8A control panel.
→ Press [3] and [0] keys in sequence.
The following menu appears:

```
NO.  --- sign of CYL ---
 1.  minus sign
 2.  plus sign

                9. exit
                0. set

                     select ?
```

• To give negative format priority. → Press [1] and [0] keys in sequence.
• To give positive format priority. → Press [2] and [0] keys in sequence.

* When you have selected the negative format (minus sign option) in this menu, if you want to use the positive format, press the [+/-] key on the ten-key pad.
When you select the positive format (plus sign option) in this menu, if you want to use the negative format, also press [+/-] key.

Pressing the [+/-] key alternates the plus and minus signs.

The values of cylindrical power are normally represented as negative numbers.

• To return to the data listing screen. → Press [9] key.

④ Specify whether to compensate the spherical power to Sph+Cyl/2 automatically (auto mode) or manually (manual mode), when measuring the cylindrical power with a cross cylinder.
→ Press [4] and [0] keys in sequence.
The following menu appears:

```
NO.  --- auto sph + ( XC )---
 1.  auto
 2.  manual

              9. exit
              0. set

                   select ?
```

- To compensate the spherical power to Sph+Cyl/2 automatically. → Press [1] and [0] keys in sequence.
- To compensate the spherical power to Sph+Cyl/2 manually. → Press [2] and [0] keys in sequence.

  * When measuring the cylindrical power with a cross cylinder, the circle of least confusion must be located on the retina. So, whenever the cylindrical power is changed by 0.50Dpt., the spherical power must be changed by 0.25Dpt. In auto mode, when the cylindrical power is changed, the spherical power also changes by the value equivalent to the variation of the cylindrical power, so that the circle of least confusion is always located on the retina.

- To return to the data listing screen. → Press [9] key.

⑤ Reset the calendar and clock built in OT-8A.
→ Press [5] and [0] keys in sequence.
The following menu appears:

```
No.  --- date time set ---

  9111271030  (91/11/27 10:30)

**********       +/-   : exit
                 enter : set
```

• Enter date and time from the ten-key pad on the control panel.

For example, to enter the date and time "Dec. 28, 1991 10:24". → Press [9], [1](year), [1], [2](month), [2], [8](day), [1], [0](hour), [2] and [4](minute) keys in that order.
The following menu appears:

```
    --- date time set ---

 9111271030  (91/11/27 10:30)

 9110281024       +/-   : exit
                  enter : set
```

→Press [ENTER] key.

• To return to the data listing screen. → Press the [+/-] key.

⑥ Specify the order of year, month and day displayed by OT-8A.
→ Press the [6] and [0] keys in sequence.
The following menu appears:

```
NO.  --- date Y.M.D select ---
 1.  Y.M.D.
 2.  M.D.Y.
 3.  D.M.Y.
                 9. exit
                 0. set

                      select ?
```

• To display year, month and day in that order. → Press [1] and [0] keys in sequence.

• To display month, day and year in that order. → Press [2] and [0] keys in sequence.

• To display day, month and year in that order. → Press [3] and [0] keys in sequence.

• To return to the data listing screen. → Press [9] key.

⑦ Set the format of the clock built in OT-8A to 24 or 12 hours.
Press [7] and [0] keys in sequence.
The following menu appears:

```
NO.  --- time 24h or 12h ---
 1.  24h
 2.  12h

              9. exit
              0. set

                   select ?
```

- To use the 24-hour format. → Press [1] and [0] keys in sequence.
- To use the 12-hour format. → Press [2] and [0] keys in sequence.
- To return to the data listing screen. → Press [9] key.

⑧ Initial setting comes into effect by turning off OT-8A and turning it on again.

4. Settings for Customer 2

→ Press secret key.

→ Press the [2] and [0] keys in sequence.
The following menu appears:

```
NO.  --- for customer 2 ---
 1. recos reti   6. PD select
 2. prism preset
 3. VA select
 4. X.C value    9. exit
 5. chart auto   0. set

                    select ?
```

① Set the compensation lens used for measurement on a retinoscope using the OT-8A lens chamber.
→ Press the [1] and [0] keys in sequence.
The following menu appears:

```
NO.  --- recos retino ---
 1.  1.50D
 2.  2.00D

              9. exit
              0. set

                  select ?
```

• To measure with a distance of 66 cm. → Press the [1] and [0] keys in sequence.

• To measure with a distance of 50 cm. → Press the [2] and [0] keys in sequence.

* 1/0.66 m = 1.50Dpt.
1/0.50 m = 2.00Dpt.

• To return to the data listing screen. → Press the [9] key.

② Enable the extra cross cylinder function (for rotating a cross cylinder by 45° step).
→ Press the [2] and [0] keys in sequence.
The following menu appears:

```
NO.  --- prism preset  ---
 1.  ON
 2.  OFF

              9. exit
              0. set

                  select ?
```

• Press [9] key to preset the prism. → Press the [1] and [0] keys.

Press the [R] key.
Press the [9] key to go to the prism measurement mode.

		Right eye	Left eye
FAR	for FAR	3 ΔDpt. UP	10 ΔDpt. IN (Recos plate)
NEAR	for NEAR	3 ΔDpt. UP	10 ΔDpt. IN (Recos plate)

The values in the chart are set for binocular vision BI. (Right eye prism setting possible.)

* Vertical phoria setting
Show the horizontal single line chart. At 10 ΔDpt. IN for the left eye, the chart separates right and left. At 3 ΔDpt. UP for the right eye, the chart separates vertically when a rotary prism is added.
As the right eye prism power is reduced, the heights of the left and right sections of the chart become the same. The prism power given then becomes the measurement value.
Remove motor fusion by having the patient cover and uncover his right eye with the palm of one hand.

Press the [L] key.

Press the [9] key.

		Right eye	Left eye
FAR	for FAR	6 ΔDpt. UP (Recos plate)	15 ΔDpt. IN
NEAR	for NEAR	6 ΔDpt. UP (Recos plate)	10 ΔDpt. IN

The values in the chart are set for binocular vision BI. (Left eye setting possible.)

* Lateral phoria setting
Show the horizontal single line chart. At 6 ΔDpt. UP for the right eye, the chart separates vertically. At 15/10 ΔDpt. IN for the left eye, the chart separates vertically when a rotary prism is added.
As the left eye prism power is reduced, the vertical sections of the chart is aligned. The prism power given then becomes the measurement value.
Remove mortor fusion by having the patient cover and uncover his right eye with the palm of one hand.

*** Pressing the [R/L] key has no effect.

③ Specify the format of visual acuity. Two formats are available, fraction (20/20) and decimal (1.0).
→ Press [3] and [0] keys in sequence.
The following menu appears:

```
NO.  --- VA select ---
 1. 200
 2. 0.1

              9. exit
              0. set

                   select ?
```

• To display visual acuity as a fraction. → Press the [1] and [0] keys in sequence.

• To display visual acuity as a decimal. → Press the [2] and [0] keys in sequence.

• To return to the data listing screen. → Press the [9] key.

④ Specify the power of the cross cylinder lens.
→ Press the [4] and [0] keys in sequence.
The following menu appears:

```
NO.  --- value of X.C ---
 1. 0.50D
 2. 0.25D

                9. exit
                0. set

                    select ?
```

- To use the 0.50Dpt. cross cylinder lens. → Press the [1] and [0] keys in sequence.
- To use the 0.25Dpt. cross cylinder lens. → Press the [2] and [0] keys in sequence.
- To return to the data listing screen. → Press the [9] key.

⑤ Set to link with the chart.
← Press the [5] and [0] keys.
The following menu appears:

```
NO.  --- chart auto move ---
 1. ON
 2. OFF

                9. exit
                0. set

                    select ?
```

- Use by linking the chart with NP-3, NC-5, NC-7, and NC-10.
  → Press the [1] and [0] keys.

  To match with each chart, Nos. 1-6 on DIP switch S1 on the back of the operation unit must be set.
  Refer to "Settings for Using the Optional Remote Controller" in page V-16 for detailed information.

- Use without linking to the chart. → Press the [2] and [0] keys.
- To return to the original measurement data display. → Press the [9] key.

⑥ Setting single-eye PD mode, both-eye PD mode
→ Press the [6] and [0] keys.
The following menu appears:

```
NO.  ---   PD  select    --
 1. R PD, L PD
 2. R+L PD

                9. exit
                0. set

                     select ?
```

• Use the single-eye PD mode. → Press the [1] and [0] keys.

Use the [R] and [L] keys to move the right and left eyes, respectively, up to 25-40 mm, one eye at a time.

• Use the both-eye PD mode. → Press the [2] and [0] keys.

Move the right and left eyes together up to 50-80 mm.

• To return to the original measurement data display. → Press the [9] key.

• Return to the measurement data display. → Press the [9] key.

5. Setting of the Interface (RS-232C)

→ Press secret key.

→ Press the [3] and [0] keys in sequence.
The following menu appears:

```
NO.  ---  interface   ---
 1.  RS232C ch1
 2.  RS232C ch2
 3.  1 data direct in
 4.  data out     9. exit
                  0. set

                      select ?
```

① Make the communication mode match with that of the device connected to CH1.
→ Press the [1] and [0] keys in sequence.
The following menu appears:

```
NO.  --- CH1: RS232C---
 1. NR-5000 etc...
 2. NR-5100 etc...
 3. selector
 4. IC card      9. exit
 5. no use       0. set

                  select ?
```

a. When you connect a device of NK mode such as the NR- 5000/7000 to CH1.
→ Press the [1] and [0] keys in sequence.

* When you use the NR-5100 in NK mode, and when you use the NR-7000, select this option. The interface cable must also be set to NK mode.

b. When you use the NR-5100 in NNK mode. → Press the [2] and [0] keys in sequence.

* The interface cable must also be set to NNK mode.

c. When you connect a selector to CH1. → Press the [3] and [0] keys in sequence.

* Set the interface cable according to the communication mode of the connected device.

d. When you connect the IC card reader/writer with the OT-8A. → Press the [4] and [0] keys in sequence.

* Disconnect the cable of an external device from CH1 and the IC card reader/writer to CH1. The external device connected to CH1 cannot be used.

e. When you do not connect a device to CH1. → Press the [5] and [0] keys in sequence.

f. To return to the data listing screen. → Press the [9] key.

② Make the communication mode match that of the device connected to CH2.
→ Press the [2] and [0] keys in sequence.
The following menu appears:

```
NO.  --- ch2: RS232C ---
 1. NL-30, NR-5000 etc...
 2. NR-5100 etc...

 4.  no use      9. exit
                 0. set

                   select ?
```

a. When you connect a device of NK mode such as the NR-5000, NL-30 and NL-2 to CH2.
→ Press the [1] and [0] keys in sequence.

* When you use the NR-5100 in NK mode, or when you use the NR- 7000, select this option. The interface cable must also be set to NK mode.

b. When you use the NR-5100 in NNK mode. → Press the [2] and [0] keys in sequence.

* The interface cable must also be set to NNK mode.

c. When you do not connect a device to CH2. → Press the [4] and [0] keys in sequence.

d. To return to the data listing screen. → Press the [9] key.

③ Specify the number of data items that the OT-8A receives from the device connected with CH1 or CH2 when the [REF] and [LM] keys are pressed. There are two options: 1 and 8.
→ Press the [3] and [0] keys in sequence.
The following menu appears:

```
NO.  --- 1 data direct in ---
 1. ON
 2. OFF

                9. exit
                0. set

                     select ?
```

a. To receive only one data. → Press the [1] and [0] keys in sequence.

b. To receive eight datas. → Press the [2] and [0] keys in sequence.

c. To return to the data listing screen. → Press the [9] key.

④ Setting for sending data to the device connected to CH1 or CH2
→ Press press the [4] and [0] keys in sequence.
The following menu appears:

```
NO.  --- data out at PRINT ---
 1. ch1 : data out
 2. ch2 : data out
 3. no data out
                9. exit
                0. set

                     select ?
```

a. To send data to the device connected to CH1. → Press the [1] and [0] keys in sequence.

b. To send data to the device connected to CH2. → Press the [2] and [0] keys in sequence.

* To send data, press the [PRINT] key. If the printer is set up so that it prints data when the [PRINT] key is pressed, data is printed first and sent.

c. To not send. → Press the [3] and [0] keys.

d. To return to the data listing screen. → Press the [9] key.

⑤ Return to the measurement data display. → Press the [9] key.

6. Exiting from the Initial Settings Mode

→ Press the [9] key.

① Return to the measurement data display.

② Turn off the OT-8A operation unit power switch.

③ On the bottom of the operation unit, set No. 7 on DIP switch S1 and No. 1 on DIP switch S2 to OFF.

④ Turn the cover 90° to cover the DIP switches, insert the + screw and tighten the other screw.

⑤ Turn on the OT-8A operation unit power switch.

*** After setting the initial settings, turn off the power, return the DIP switch to the original position, then turn on the power.
If No. 7 on DIP switch S1 is set to ON, pushing the secret key enters the initial settings mode.
If No. 1 on DIP switch S2 is set to ON, the initial settings stored in the EEPROM on the operation unit CPU board may be rewritten.

7. Printing Out the Initial Settings

① Holding down the [ADD] and [Prism] keys together, turn on the power to enter the test mode.

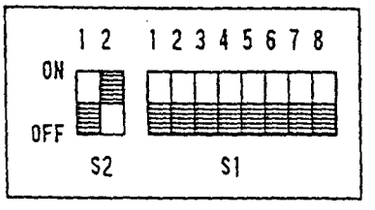
② Press the [Print] key.

③ All initial settings are printed out.

8. Settings for Using the Optional Remote Controller

When the DIP switches on the bottom of the OT-8A operation unit are set, the remote controller can be used together with the NP-3, NC-5, NC-7, or NC-10.

① Location of DIP switches
Turn off the OT-8A operation unit power switch.
Turn the operation unit over. Remove the + screw on the cover on the bottom of the operation unit and turn the cover 90° to expose the DIP switch.



DIP switch on bottom of operation unit.

Nos. 1-5 on DIP switch S1 are used for the optional remote controller link settings.

No. 7 on DIP switch S1 is used for initial settings, and Nos. 6 and 7 are not used.
No. 1 on DIP switch S2 is used for EEPROM write protection, and No. 2 is used to switch the backup battery on or off.

② Setting the DIP switch

DIP switch		Description
No.	No. 1 No. 2	Set when several visual acuity test charts are used.
	No. 3 No. 4 No. 5	Set the type of visual acuity test chart used.
	No. 6 No. 7 No. 8	Not used Secret key protection for initial setting Not used

③ Setting the type of visual acuity test chart

- Each type of test chart uses a different remote controller. Set DIP switches Nos. 3-5 for the remote controller used.

Type of remote controller		Product code	DIP switch		
			No.3	No.4	No.5
NP-3	Decimal point format	DCB00503	OFF	OFF	OFF
	Fractional format	DCB00502	ON	OFF	OFF
	INC	DCB00501	OFF	ON	OFF
NC-5		DCB00504	OFF	OFF	ON
NC-7		DCB00603	OFF	ON	ON
NC-10		DCB00505	ON	OFF	ON
For OT-8A only		DCB00602	ON	ON	ON

④ Setting for multiple OT-8A systems and test charts

- A remote controller can send four types of signals generated from different conditions of the jumper wire and slide switch in the battery box.
- Set No. 1 and 2 of the OT-8A DIP switch so that multiple OT-8As can receive different signals.
- Up to two NC-10s can be used by changing the IC on the printed circuit board in one NC-10.

a. For NP-3, NC-5, NC-7, and OT-8A only

Remote controller setting		OT-8A DIP switch		NP-3 Main body		NC-5 Main body jumper		NC-7 DIP switch 2	
Jumper wire	Slide switch	No.1	No.2	No.3	No.4	JP (red)	JP (green)	No.2	No.3
Connect	Right	OFF	OFF	OPEN	OPEN	Connect	Connect	OFF	OFF
Connect	Left	ON	OFF	OPEN	ON	Connect	Disconnect	OFF	ON
Disconnect	Right	OFF	ON	ON	OPEN	Disconnect	Connect	ON	OFF
Disconnect	Left	ON	ON	ON	ON	Disconnect	Disconnect	ON	ON

* Make sure the NP-3 ROM version is 2.0 or 6.0.

b. Remote controller for NC-10

Setting of remote controller		OT-8A DIP switch		IC of NC-10 (Main body)
Jumper wire	Slide switch	No.1	No.2	
Connect	Right	OFF	OFF	M50111P
Connect	Left	ON	OFF	M50111BP

* Up to two NC-10s can be used with OT-8A. To use two, change the IC on the printed circuit board in one NC-10.

⑤ Linkage between OT-8A and a test chart

a. Operation on a test chart

- Selecting one of the particular test charts and pressing the remote control key sets the lenses required to look at the selected chart in the OT-8A lens chamber.

Visual acuity test chart	OT-8A lens chamber	
Cross cylinder test chart	[XCC1]	Cross cylinder lens XC
Polarized test chart	[2]	Polarizing lens P1
Worth's four-dot chart	[7]	Red lens RL and green lens GL

b. Setting one or two lenses in the OT-8A lens chamber selects the corresponding visual acuity test chart.

OT-8A lens chamber		Visual acuity test chart
[2]	Polarizing lens P1	Muscle balance test chart
[3]	Polarizing lens P2	
[7]	Red lens RL and green lens GL	Worth's four-dot chart

* When a test chart is linked with the OT-8A by a remote controller, the abbreviation of the selected test chart is displayed on the OT-8A control panel.

When the OT-8A is turned on, the linked test chart is also initialized.